



Fresh Air Practices in English and Scottish Homes

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About Natural Ventilation News

This Newsletter is produced by the CIBSE Natural Ventilation Group Management Committee to inform members and potential members of the work being undertaken by the Group to benefit the discipline of natural ventilation within CIBSE. The management committee wish to encourage contact with all interested partners. Communication can be directed to the Group at CIBSE Headquarters or to individual Management Committee members.

Editor

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Savings with Natural and Hybrid Ventilation

Jannick Karsten Roth, Richard Arnott, and Carl Sutterby,

WindowMaster

The Fraunhofer Institute in Stuttgart has performed a detailed analysis of an office building with an area of almost 3000m² equipped with either natural, mechanical or hybrid ventilation. The building performance was investigated in three different locations in Europe; Copenhagen, London and Munich. Indoor air quality (CO₂) and thermal comfort (operative temperature) were evaluated in accordance with the European Norm "EN15251" Category II. The indoor climate was kept

identical for all three ventilation principles as this would make the consumed energy more comparable. Table 1 shows the requirements for the operative temperature and carbon dioxide level according to "EN 15251" Category II.

Energy Consumption

Figure 1 shows the primary energy consumption (sum of heating and fan electricity demand multiplied with primary

Category	Operative Temperature (Winter) [°C]	Operative Temperature (Summer) [°C]	Operative Temperature (Transient) [°C]	Carbon Dioxide Level during the year [ppm]
II	20 ≤ t ₀ ≤ 24	23 ≤ t ₀ ≤ 26	20 ≤ t ₀ ≤ 26	≤ 900

Table 1: Requirements of EN15251 category II

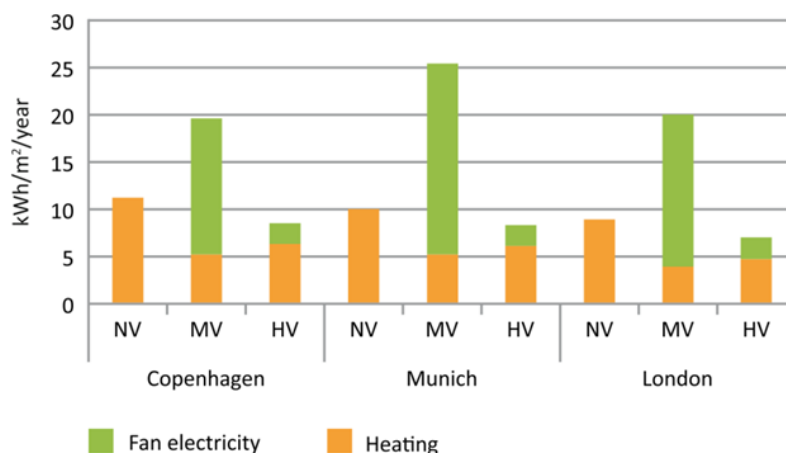


Figure 1: Primary Energy Consumption

The CIBSE Natural Ventilation Group

The CIBSE Natural Ventilation Group is a large, international group, that was founded in 1994. The committee comprise some 55 members serving a wider membership of 7520.

Group Aims

The aims of the group are:

- to ensure natural ventilation is properly considered at the design stage equally with mechanical ventilation or air conditioning;
- to disseminate knowledge via seminars and publications;
- to recommend research projects;
- to be at the forefront of knowledge about the low energy, environmental and economic performance of natural ventilation;
- to work with consultants, contractors, manufacturers and researchers in pursuing these aims.

Links

To access the Natural Ventilation Group cut and paste the following link into your browser or click [here](http://www.cibse.org/index.cfm?go=groups.details&item=11):
<http://www.cibse.org/index.cfm?go=groups.details&item=11>

Committee Officers

Professor Derek Clements-Croome
Reading University (Chairperson)
Dr. Benjamin Jones
University College London (Secretary)

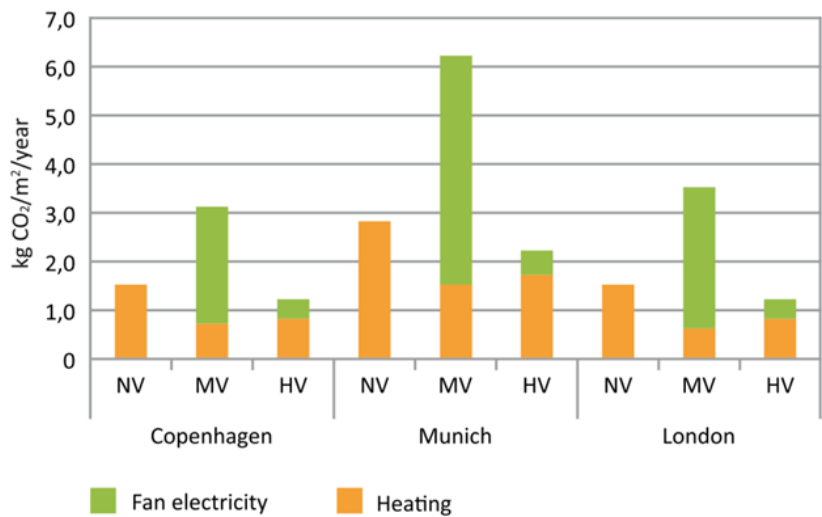


Figure 2: CO₂ emissions

energy factors) for the three ventilation principles.

The result shows that natural ventilation (NV) uses 9-11 kWh/m²/year, mechanical ventilation (MV) 20-25 kWh/m²/year and hybrid ventilation (HV) 7-8.5 kWh/m²/year. Hybrid ventilation enables energy savings of 20-25% compared with natural ventilation and 60-70% compared with mechanical ventilation.

Based on the Fraunhofer results the CO₂ emissions and the economy seen over a 20 year calculation period were calculated.

Carbon Dioxide

In comparing the CO₂ emissions from electricity use and heating it can be seen that natural and hybrid ventilation emits much less CO₂ compared to a mechanical system during one year. The hybrid ventilation emits approximately 20% less than natural ventilation.

Economy

A Life Cycle Cost (LCC) over a 20 year period has been performed, which includes the capital cost, maintenance of

the systems and the operational cost (electricity and heating). Over a 20 year period the natural ventilation system is 5 times cheaper than the mechanical system. The hybrid system is 2.5 times cheaper than the mechanical system.

Based on calculations by the Fraunhofer Institute it was found that natural and hybrid ventilation reduce the energy, CO₂ emissions and Life Cycle Cost compared to a mechanical system. Each of the two systems has pros and cons and WindowMaster can help you choose the optimal system that fits your purpose/building.

About the lead author

Jannick Roth graduated from Technical University of Denmark in 2009 with an M.Sc. In Civil Engineering, with specialisation in Indoor climates and installations. After graduating he joined WindowMaster as a consultant in Natural Ventilation, where he carries out dynamic simulations of the indoor climate and energy consumption for new and refurbishment projects. He also produces flow calculations using CFD and is involved in research projects.

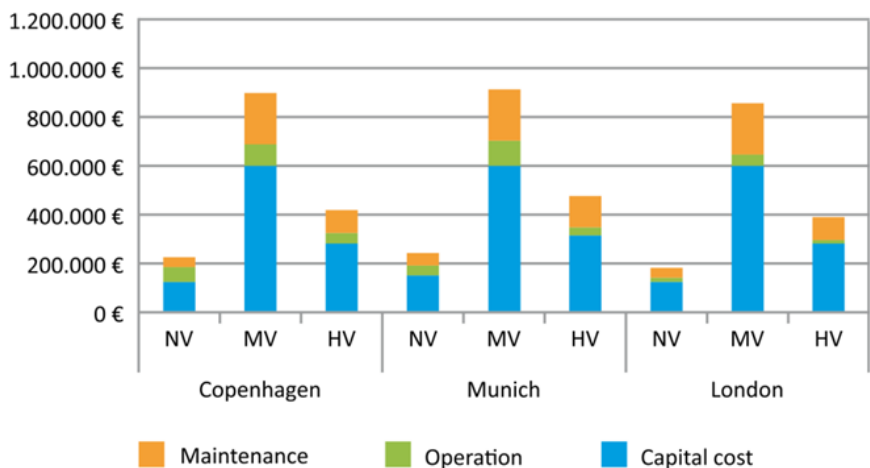


Figure 3: Economy

ASHRAE—IAQ 2013

Environmental Health in
Low Energy Buildings

Vancouver, Canada

15-18th October 2013

IAQ 2013 will review the state of knowledge of the balance of environmental health and energy efficiency in buildings and help define future education, policy and research directions. With an increasing emphasis on energy conservation, there is a tendency to ignore the purpose of the use of much of that energy, the maintenance of good indoor environmental quality. The roles of building, HVAC and passive system design and operation for achieving good environmental health in low energy buildings are the core themes of this conference.

The conference program will include internationally acclaimed keynote speakers, original peer reviewed conference papers and extended abstract presentations. Abstracts are invited in the following subject areas:

- Environmental Health in Low Energy Buildings
- Moisture and Health
- Sources and Chemistry
- IEQ Factor Interactions
- Residential Buildings
- Commercial and Institutional Buildings
- Air Cleaning and Filtration
- Microorganisms and Infection
- Tools (models, measurements and more)



Less Noise, More Sound

Richard Cowell FIOA

Picture: some rights reserved by BombartZ

We know well that plans for naturally ventilated buildings in noisy locations can be seriously compromised by the high external sound levels. Very often, openings will result in excessive internal background noise. We also see the evidence that noise is linked with adverse health effects getting stronger (WHO 2011, [1]), so the case for limiting noise (unwanted sound) gets stronger with it. Equally, we are developing increasing understanding of the benefits of positive ('wanted') sound. We need to make careful judgements between what is noise, and what can be used as positive sound.

We also know that it is common sense to locate ventilation openings in positions least exposed to the external noise. We also have products available that contribute modest attenuation at openings with modest pressure drop available for use in a variety of configurations e.g. Silenceair, Passivent, NAT Vent. Basic guidance for balancing airflow and attenuation was set out in a CIBSE talk in May 2008 [2] Opening up internal acoustic linings to expose thermal mass and inducing pressure differences with stack effects

can also help acoustic elements to contribute to sustainable design. These factors are reasonably well understood and have strong influence on practical options for natural ventilation.

One area where value is still to be realised has been the re-examination of limits on noise getting in to buildings. There is a wide array of guidance and regulation, developed around sealed and mechanically ventilated buildings that set out limits on noise entering them. When adjustable openings in the facade are permitted, human response is different. To clarify targets for naturally vented buildings, we need to return to fundamentals.

We have to limit aural disturbance and distraction. If the dynamic range and character of the external sound is helpful (i.e. wanted because of the benefits), and building occupants appreciate the added freedom to adjust openings in the facade, we should expect tolerance of higher levels of the sound. Best options arise when external sound is reasonably even (not always practical in a typical urban context). We should open up the façade in environments

Forthcoming Conferences:

World Building Congress 2013

Built Environment Research
Focused on Social Outcomes

Brisbane, Australia

5-9th May 2013

http://wbc@buildingcongress2013.com/utm_source=World+Building+Congress+2013utm_medium=emailutm_campaign=wc5351013a_Call_for_Abstracts_extension6_28_2012&utm_medium=email

This triennial Congress will focus on the relationship between Construction and Society.

How can research help to maximise the contribution of constructed assets to social goals?

How will the research community meet emerging social needs?

These questions are addressed through the CIBs Research Commissions. All Commission interests will be covered at the congress.

where the quality of the sound environment allows it, i.e. where sounds are reasonably even, and to the sounds of nature where available. In short we need to control the unwanted sound and allow the wanted, or positive sound, rather than to reduce it all indiscriminately.

Inside buildings, we must allow for intelligibility of conversation, locally. Textbook guidance on this would allow us to raise incoming sound levels significantly. We also have to consider aural privacy, usually helped by *higher* ambient sound levels that provide masking, if reasonably consistent (not always the case, of course).

After several years suggesting scope for better criteria, Field [3] carried out studies which confirmed that higher limits may be permissible for naturally ventilated buildings. Limited studies using pre-recorded traffic noise filtered through a naturally ventilated facade were used to assess task distraction for office-related tasks. Although more work is needed, here was an indication that, sensibly, target limits might be raised.

We are also getting clearer data on the performance of open windows e.g. Nunes *et al.* [4] More expensive shielded windows in double or screened facades are better understood. For sustainable design, we need to use all the tools as accurately as practical and accurate target setting has to contribute to this.

A creative approach from 'backs to the wall' acoustic designers can free up design options, if only we can look again at British and International Standards to gather some target flexibility. Although more work is needed, it is already clear that current targets are likely to be some 5dB too severe, where natural ventilation is concerned. This has been recognised in school design most recently, with the government accepting a 5 dB relaxation on noise internal ambient levels for refurbished classrooms [5]. Such a margin has a major impact on natural ventilation strategies and needs to be explored. Field [3] has suggested that we should consider a specific rating system such as an NV-NR rating, keeping attention on spectral content. Some

account of sound character is also an ingredient worth considering further.

There is real value in this. For some time now, this opportunity has not been addressed and acceptance of the status quo is not good enough. To change this, Building Services Engineers and Acousticians need a combined effort in two areas. First, a regular recognition of what sound we can use positively, and second, to complete the research and leverage improvement in formal standards.

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About the Author

Richard Cowell is a Consultant to Arup and a Fellow of the Institute of Acoustics. A representative for the Institute of Acoustics (IOA) has been kindly welcomed to attend meetings of the CIBSE Natural Ventilation Group. Both organisations are keen to explore cross-discipline learning, to achieve better building designs.

Forthcoming Conferences:

Environment and Health—Bridging South, North, East and West

Basel, Switzerland

19-23rd August 2013

<http://www.ehbase13.org/>

In August 2013, three leading scientific societies in the field of health and the environment will come together in Basel for the 2013 Conference on Environment and Health – Bridging South, North, East and West; an interdisciplinary event dedicated to research to improve local, national and global public health.

The first-ever joint conference of the International Society for Environmental Epidemiology (ISEE), the International Society of Exposure Science (ISES), and the International Society of Indoor Air Quality and Climate (ISIAQ) hosted by the Swiss Tropical and Public Health Institute (Swiss TPH) offers scientists, researchers and health professionals from all over the world an excellent and affordable platform from which to discuss the latest scientific achievements at the interface of health, disease prevention, the environment, and policy-making.

Some 1,500 international experts, junior scientists and doctoral students are expected to participate. The conference will offer a diverse programme of symposia, oral presentations, poster sessions and lively round table discussions, as well as plenary sessions featuring keynote speakers from around the world.



Fresh Air Practices in English and Scottish Homes

Bettina Hauge, MSc, PhD, Copenhagen University & Technical University of Denmark

"I just open the windows when my wife tells me to, it's part of my to-do list, my 'listed jobs'", Julian says, laughing. "It does tend to be me though", his wife adds.

This article presents anthropological research results on how and why English and Scottish families use the fresh air from outside into the home (FAFOH). The introducing exchange was often heard in the English and Scottish families visited. Throughout the entire study the opposite only occurred in a few cases: The man opening the window, the woman closing it, in her own words: "so that I stay snug".

Anthropology is about people's relations with their environment (whether nature, things, or people), and in this study the main aim was to explore the significance of fresh air to people by asking the following:

- *What are people's views on the fresh air in their home?*
- *How, where and when do they use the fresh air from outside into their homes?*
- *What are their motivations for using it – and for not using it?*

Studying people's behaviour at home anthropologically means that you do in-depth interviews and observe their actions, asking and looking for anything that shows an affiliation with air, the research focus being on people's relations with the fresh air from outside. Since we could expect that people air out differently according to thermal zones, season, state of the building and its windows/doors, and according to age and individual preferences, families participating in the study lived in warm, cold, wet, dry, windy regions; in the countryside and the cities; had different age, family type and size, etc. The study was not to be representative or to study particular houses, areas, or age groups/lifestyles, but to make a holistic exploration of people's views and actions regarding fresh air from outside.

Ventilation Practices as Ritualized Habits

English and Scottish FAFOH practices were performed mainly for three reasons:

Disclaimer:

The views and opinions in this journal are those of the authors and do not necessarily reflect those of their employers or the CIBSE Natural Ventilation Group.

1. Functionality (layer practical reasons);
2. Aesthetical reasons (body and senses)
3. Social reasons (in particular for taking care of the health of the family and to manage impressions).

The three were to some extent entangled and appeared as ritualized habits: Every day people did the same things with respect to air: *"I do it without even thinking about it"* or *"we just do it as a matter of course"* were frequent comments.

The frequency of ventilating one's home depends on the season, context and the house. Together the three constitute FAFOH's value to people, expressed in the following ways:

1. Use of FAFOH was motivated by *layer practical activities* where fresh air facilitated the progress of the activity: When cleaning, ironing, cooking fresh air was an element in the practice that made the activity more pleasant or faster:

"I air out when I'm doing the beds and when I dry the clothes. I sometimes do that in the bedrooms."

2. Use of air was determined by body and senses: People described the need for fresh air as a purely sensuous experience that they enjoyed, but also as something very personal, reflecting individual comfort zones:

"The thing is, I must have fresh air."

The fresh air also made them able to follow the seasons (through sounds and smells) and pass on insights on the weather useful for clothing purposes or leisure activities:

"Even at work I open the windows to hear the birds [...] Sometimes, especially when you feel a bit blue, I open the windows. A bit of fresh air and you wake up a bit. It's the lack of oxygen, people forget that we sometimes need oxygen."

3. Socio-culturally determined use of air:

"I wouldn't leave any of the bedroom windows open, especially not the back window, it's a security issue"

FAFOH was connected with *risks* (fear of Radon, burglary through an open window, or the need for ventilation following water damage) and with certain *taboos*, since letting fresh air in also is about letting certain odours out (toilet & bedrooms). When having guests *impression management* is required for the odour backdrop in the home.

Different practices were seen among the family members, in particular regarding the need to feel fresh and alive from sensing a breath of air when opening a window, but, in general, air practices appeared as ritualized habits, bodily and socially determined.





Brian's plug air freshener and safety vent

Theories Explaining Our Use of Air

The analysis further showed that the use of FAFOH seemed to increase in transitions, like when returning home from work, coming back to the house after a holiday, or in the morning after a night's sleep. Such transitions reflect identity aspects and supports the idea that airing out practices include important social features. By drawing on ritual theory, phenomenology and sociological theory the study shows fresh air as a way for people to be embedded in the world, feeling a belonging to the world and to the dynamics of the season, and using the fresh air as a way of caring for the health of the family (Hauge 2010, 2013 forthcoming):

Ritual theory sheds light on particular and often routinized actions where people go from one role/phase to another (e.g. leaving one's worklife and work identity and coming home to one's family role). Such transitions often reflect identity aspects that involve a shift of identity/role. The need to recreate one's identity might explain that an increased use of ventilation was involved in transitions. The ritualized airing activities seemed to help residents build up control over their home and were referred to as actions done to safeguard and maintain the health of the family (reflecting the role of a considerate parent). This 'control' issue can thus be seen as socially motivated, based on caring for your loved ones (no matter whether air intake is from a technical system or via doors and windows).

To all informants FAFOH indicates a bodily openness and inclusion of the surrounding world. This is in accordance with *phenomenological* research, indicating that we are in this world through our body and senses and create a consciousness of our existence, our being-in-the-world, from this outset. In this view 'enjoying the breeze' represents the joy of being in the world, feeling alive precisely by sensing it. A 'good, fresh smell' in your home reflects the wish for being alive, dynamic and not crumble but remain open to the world and in a personal and physical development, in

progression. To let the fresh air into the children's rooms becomes a way of welcoming the morning, greeting the world through a feeling of co-existence with the surroundings.

Sociological theory about 'impression management' (Goffman 1959) stresses people's need for acting in a culturally acceptable manner, which here implies having a socio-culturally acceptable smell in one's home. To have a 'good, fresh smell' at home appeared vital to all the families (reflected in the frequent use of synthetic 'air freshener' in England and Scotland).

Impressions From the Field

Co-existing with our surroundings implies that we are part of our regional environment and must deal with its specificities: As expected, regional thermal differences appear in England and Scotland, resulting in heating being of more concern in the colder regions where windows and doors are opened only for short periods. Apart from the south of England the country is known for its rainy weather, so it was of little surprise that families seemed to air out less - "to stay snug" and "avoid the humid air" - in the cold, northern parts than in the south. The insulation in the house and the general state of the house also influenced on airing practices. This illustrates that airing habits are performed in dialogue with weather and the house itself.

Although it is never the aim to generalize when doing qualitative studies, it did seem that fresh air has its 'openers' (mostly women) and 'closers' (mostly men). These were terms used by the informants themselves. Fiona explains it this way:



Barbara's much loved washing line that brings the smell of fresh air in with the dried clothes

"I'm always cold, my husband is always hot and I'm always freezing, but I air out because I like fresh air, I don't like a stuffy house. He doesn't open up more than me but I think that has to do with him not cleaning either. So I don't know if it's to do with me running the house. He does certain chores, but he doesn't do the cleaning, the airing, or the washing. So if I ask him to open a window he'll open it, and he likes fresh air but he is less likely to notice if we need fresh air".

The general picture is that the women tend to care for the airing out practices of the rooms, in particular the children's rooms. It may reflect that the home is generally a female domain whenever the topic is the health of the family.

Airing out as a social activity

The most prominent perspectives of the interviews can be stated within the 3 mentioned areas of use – using FAFOH for functional, aesthetical (body & senses) and emotional (social) reasons. However, any practice needs to be put in context and therefore we need to look at these FAFOH practices in connection with the context: the meaning of *the home*. The importance of the home as a frame for creating and maintaining the family's health is playing a huge role for our use of FAFOH, just as the social importance of having a culturally acceptable home regarding smells will lead to special FAFOH practices.

This means that, in a way, FAFOH is not directly about "fresh" or "air", but covers the 'good indoor climate', which involves many things other than just 'fresh air', things that are 'side effects' of air like airing out to get sounds and smells from the environment into the home.

The *freshness* is about ...

- anti-smelling, having a pleasant odour backdrop; a bodily and sensuous way of sensing the world and the moment.
- considerations for the health of the whole family by getting rid of unpleasant smells, dust, bacteria
- enjoyment (individual needs)
- free breeze, flow and a feeling of freedom

The *air* is about ...

- Getting smells & sounds in the context from nature or the city, the joy of following the seasons
- Techniques (systems to control the air so you will not have to think about airing – i.e. need of security, to control your windows & doors, to monitor the home and the cleanliness/health in it)
- Practical functions (when cleaning, cooking, etc., FAFOH helps the progression of the activity).



Summary

The English and Scottish families showed that FAFOH was of immediate importance especially in the following situations:

- to air wet rooms and bedrooms (get rid of moisture, unwanted smells)
- to dry clothes indoors
- to regulate heating – whether hot or cold indoors or outside – and *bodily* heat regulation (the coolness from FAFOH when ironing)
- to clean (when vacuum cleaning, washing floors, making the beds)
- to let out smells (especially cooking odours) to avoid being seen as a smelly home
- to let in sounds & smells from the surroundings
- to be able to smell yourself
- to get a circulation and stale, tight air out in order to rebuild a clean and recognizable smell in the home
- to enjoy the breeze
- to indicate control



Figure 1: Map of Informants

- to indicate the transition from work to free time, night to day, being away on holiday to getting back to the home

Several of these contain a sociality uncovered in the use of FAFOH and reflect *emotional values*. The emotional values of FAFOH can be seen as expressions of:

- *Worrying* (about burglary, moisture damages, illness, etc.);
- *Caring* for the health of the family, airing as a *declaration of love*;
- *Control* expressed in the wish to define and maintain a feeling of *control* of your home and its smells

The map in Figure 1 shows the areas included in the investigation.

Acknowledgements

The research was funded by VELUX A/S and the entire report can be found at:

<http://www.soc.ku.dk/ansatte/publicationdetail/?id=6a1ae608-cffa-47a7-b92c-639c33364e19>

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About the Author

Bettina Hauge is an Assistant lecturer at Copenhagen University and the Technical University of Denmark. Her primary interests are medical anthropology; work, organisations & corporate cultures (culture studies); identity; rituals, religion; family & kinship relations; the anthropology of children (play/learning/cognition), technology. She can be contacted by email: bh@soc.ku.dk.

Natural Ventilation Group Research

The following references are to peer reviewed papers published in the past six months by members of the group management committee.

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Call for Articles

Do you have something to say on the subject of natural ventilation? Do you want to respond to any of the articles you've read here? Do you have a project in a field that relates to natural ventilation whose findings you'd like to share?

Please contact the editor.

Call for Photographs

Are you a keen photographer? Do you have photographs of naturally ventilated buildings or indoor environments that Nat Vent News could publish?

Please contact the editor.